

129/69

DEPT OF TRANSPORTATION
NHTSA

Ex Parte Meeting

01 MAY 16 AM 10:46

Dion Casey
Attorney, Office of Chief Counsel, NHTSA

Docket NHTSA-2000-8572-23

On May 9, 2001, NHTSA representatives met with representatives of IQ-mobil concerning the impending rulemaking on tire pressure monitoring systems required by the recently-enacted Transportation Recall Enhancement Accountability and Documentation (TREAD) Act.

NHTSA was represented by Dion Casey, Joe Scott, John Finneran, George Soodoo, Sam Daniel, and Jonathan Walker. IQ-mobil was represented by Anton Mangold and Sascha Kunzmann.

IQ-mobil representatives gave a presentation on their battery-free tire pressure monitoring systems. That presentation is attached.

RDKS®
by
IQ-mobil

**the passive transponder solution
for tire pressure monitoring**

IQ-mobil Electronics GmbH

**Hans-Urmiller-Ring 46
82515 Wolfratshausen
Germany**

+49/8171/4838-0

Agenda:

- 1. IQ- mobil & Investors**
- 2. Partners & Network**
- 3. TPMS overview**
- 4. RDKS construction**
- 5. Exceptional features**
- 6. Technical comparison**
- 7. Prospects**
- 8. Suggestions for safety**



Wissen bewegt Produkte

1.1 Introduction IQ-mobil Electronics GmbH



founded:

1997

founders:

Anton Mangold, Oliver Bartels

employees:

15 R&D in 2000

core-competence:

**R&D automotive rf-applications
in the GHz-range**

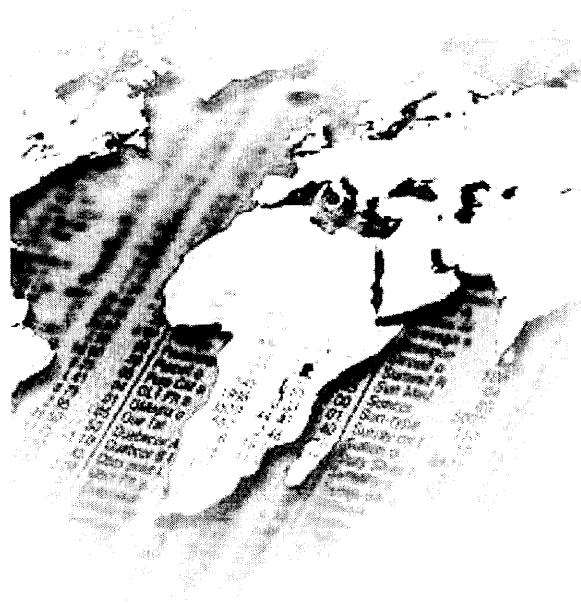
major projects:

**batteryless TPMS
blind-spot surveillance
Bluetooth communication**

Wissen bewegt Produkte

|||||

1.2 IQ-mobil investors and finance partners



3i business:

Europe's largest venture capital company

3i portfolio:

15 Bio. DM

3i facilities:

**30 offices in Europe + Japan
Singapore and USA**



3i sectors:

**automotive, engineering, IT,
communication, transport**

additional invests:

**several federal support
programs**



2.1 IQ-mobil's field partner



Wissen bewegt Produkte

founded:

1935

turnover 2000:

2 Bio. DM

employees:

6,100 in Dec. 2000

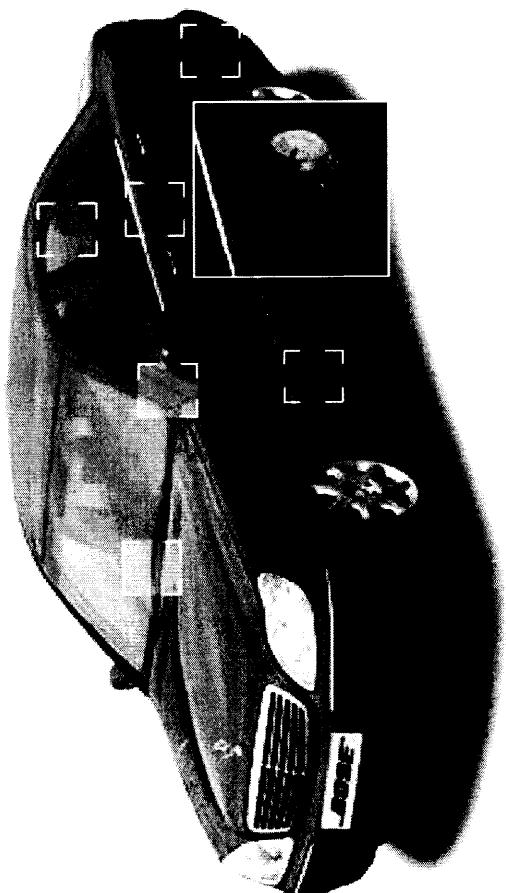
production plants:

Europe (10), USA (4), Asia (3), Australia (4)

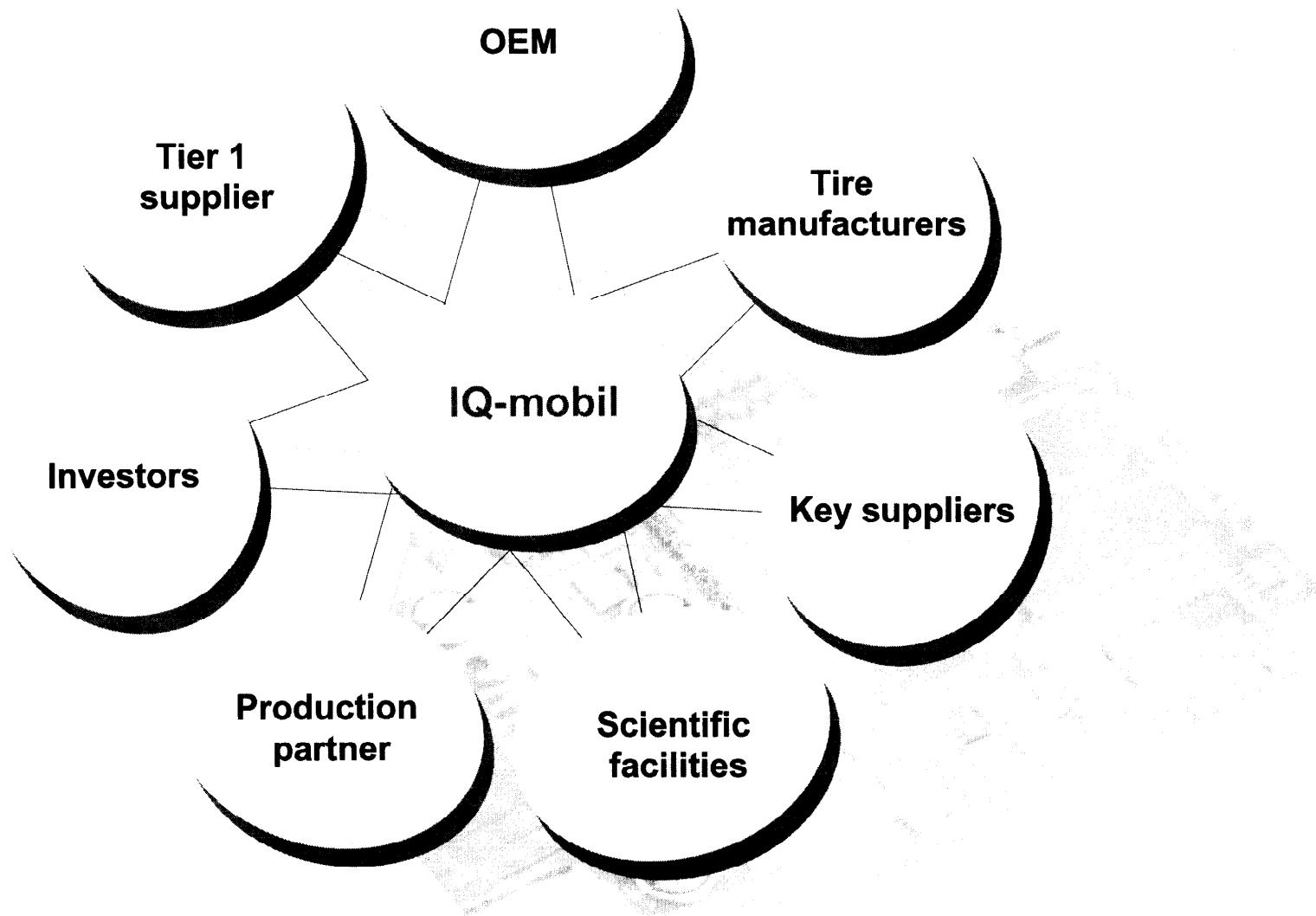
major customers:

**General Motors (3x Supplier of the Year),
Ford, Cadillac, Jaguar, DaimlerChrysler,
BMW, Audi, Volkswagen, Porsche, OPEL,
SEAT, Skoda, Volvo, Mazda, Toyota,
Mitsubishi, Nissan, Suzuki, Honda, Hyundai,
Alfa Romeo, Lancia, FIAT, Citroen, Renault,
Peugeot, EvoBus, YFCQ**

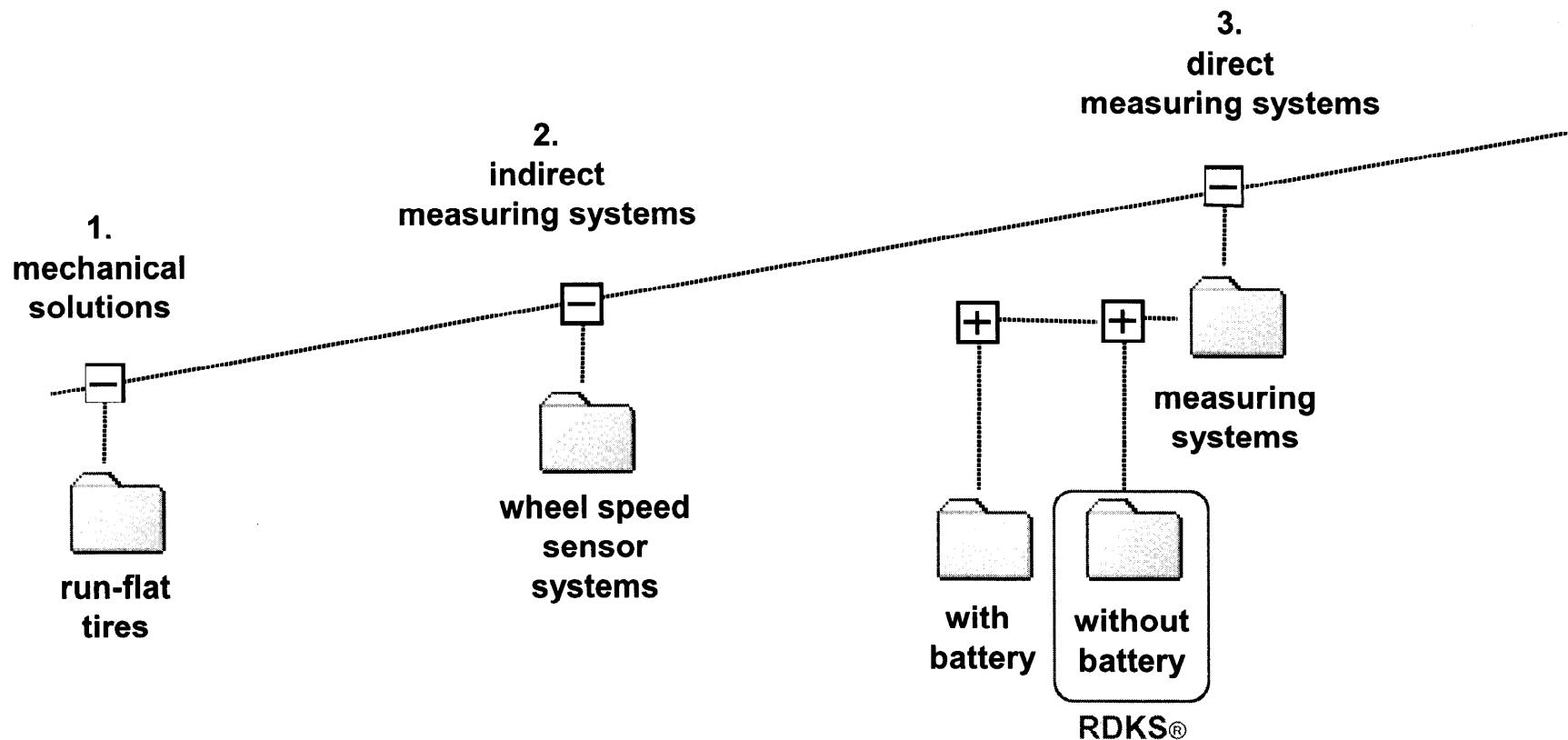

Scheibenacker



2.2 Network



3. TPMS overview



3. TPMS overview: mechanical solutions



3.1 Mechanical Solutions

PAX, EMT...

- next service station can be reached with flat tire
- no spare tire
- no deflation warning
- not preventive - only emergency aid
- high cost of ownership

ABS deflation warning system compares wheel spin signals

+ lowest costs for cars with ABS

extremely unprecise

fault susceptible

warning only if severe damaged

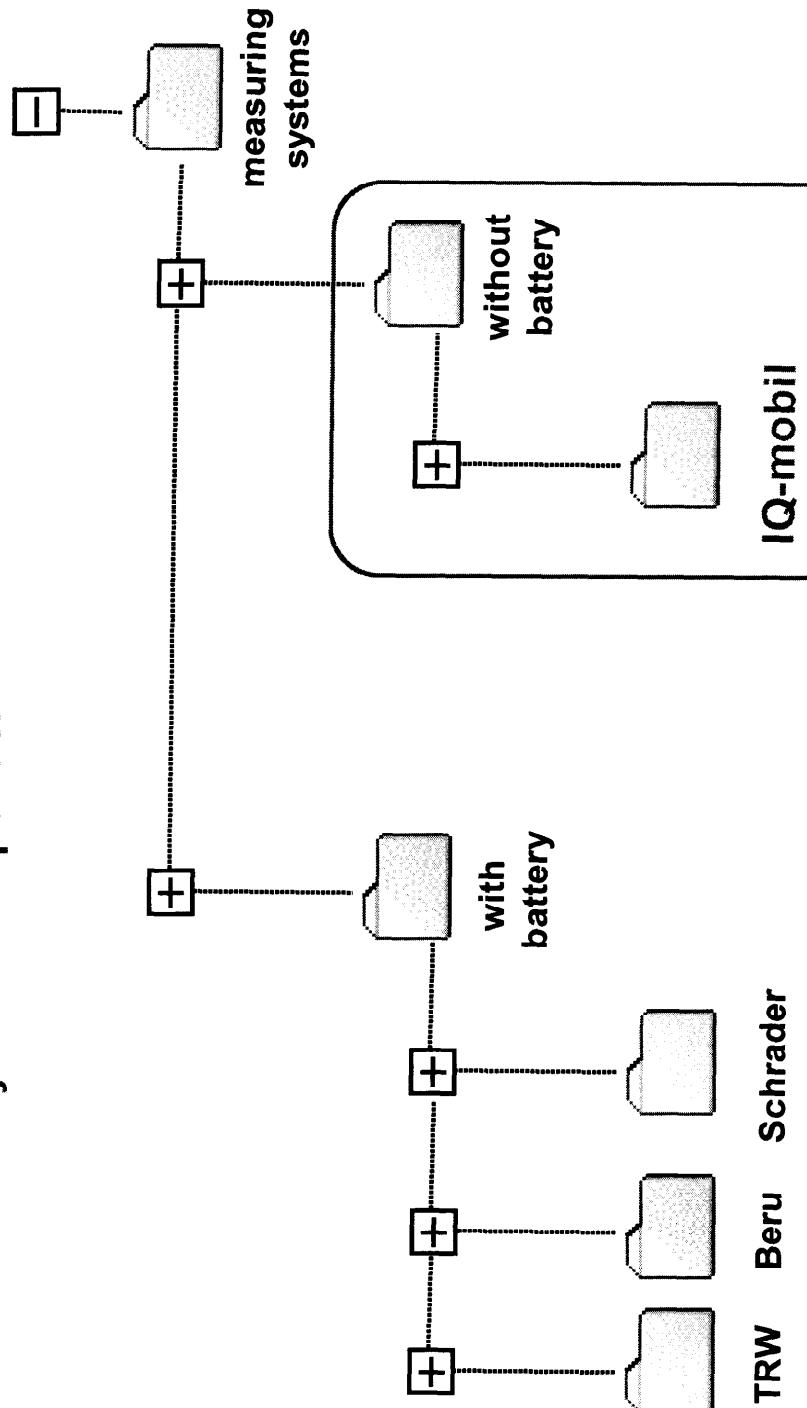


3.2 Indirect Measuring Systems

3. TPMS overview

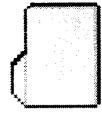


3.3 Direct Measuring Systems
battery or transponder



RDKS®

3. TPMS overview



3.3 Direct Measuring Systems

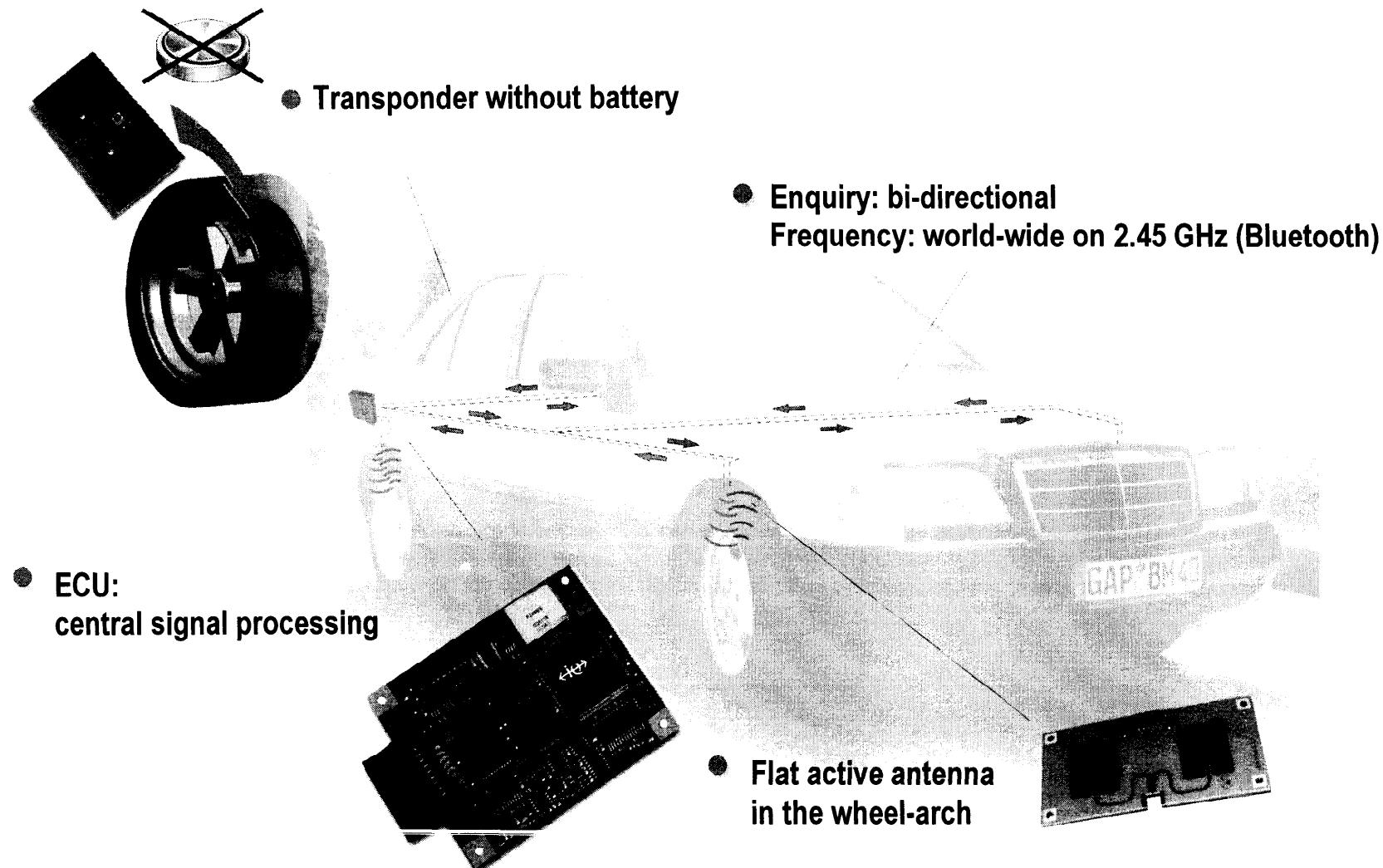
battery based solutions

- [+]** **high accuracy**
- [+]** **early warning**
- [+]** **always optimum pressure**
- [+]** **high level of safety**

- [−]** **limited lifetime**
- [−]** **high probability of interference**
- [−]** **high warning delay**

4. RDKS® construction

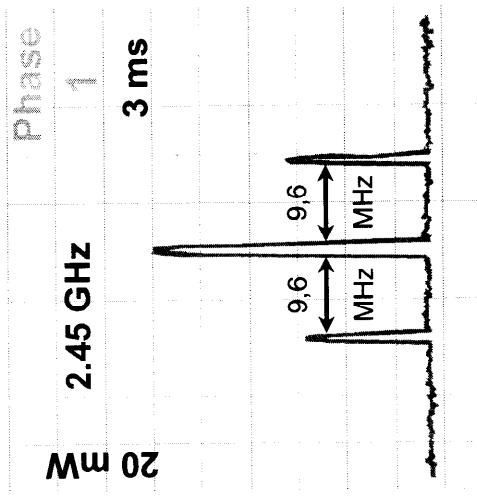
4.1 components of the system



4. RDKS® construction and components

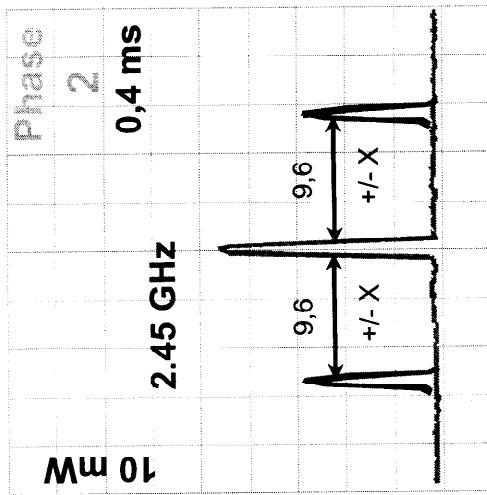
4.2 transmission principle comprises 3 phases

Phase
1
a modulation excites the resonator and stores energy on the transponder thus eliminates the need for a battery



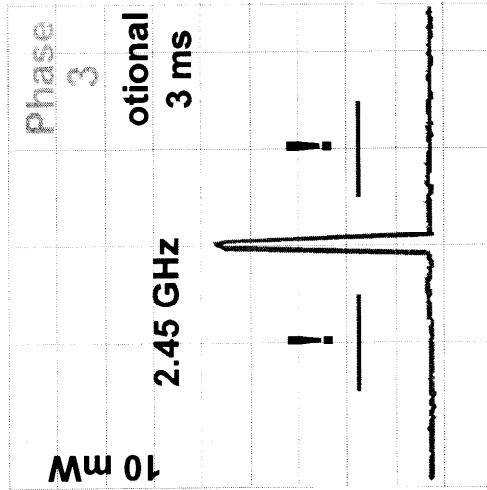
Excitation Phase

Phase
2
the pressure sensor affects the quartz frequency and re-transmits the pressure signal to the ECU



Enquiry Phase

Phase
3
a blank enquiry detects any external interference and changes automatically to any non-allocated frequency



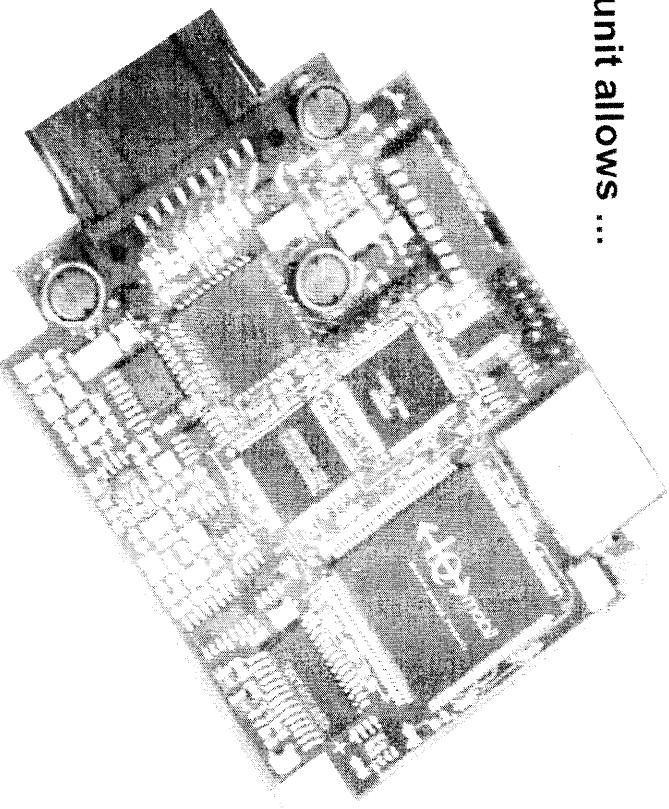
Validation Phase

5. Exceptional features of RDKS®

5.1 The control unit (ECU)

Integration of transmitter and receiver to one unit allows ...

- + immediate system availability
- + measurement on request
- + high up-date rate - up to 100/s
- + automatic search for free frequency



The data transmission with free frequency search guarantees ...

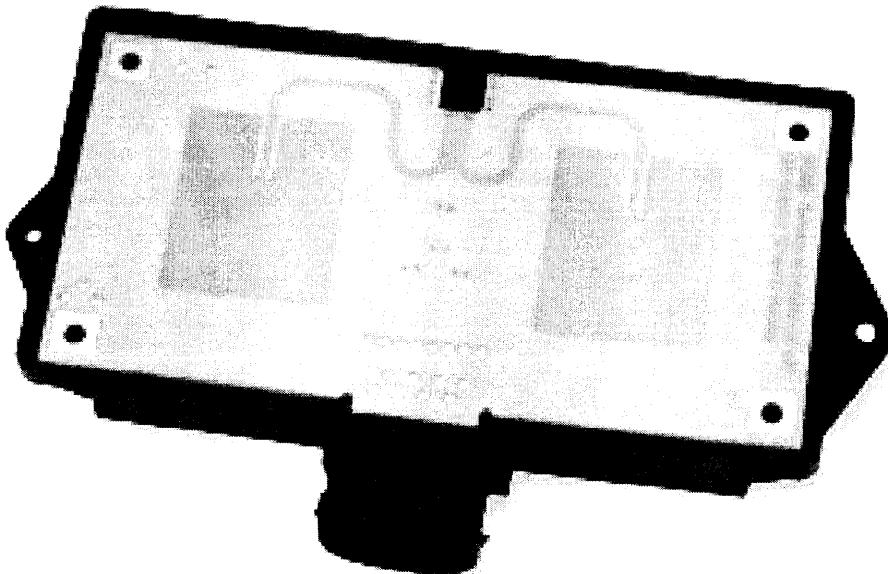
- + trouble - free coexistence with wireless consumer electronics
- + highest reliability

5. Exceptional features of RDKS®

5.2 The active antenna

An active antenna means ...

- + easy vehicle adaption
- + flat antenna surface
- + positioning lateral to the tire (no damage by flinging rocks)
- + simple twisted-pair-wiring



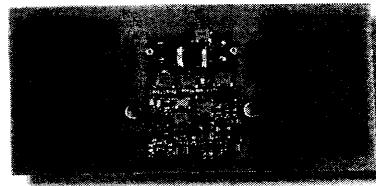
5. Exceptional features of RDKS®



5.3 The passive transponder

No battery means ...

- + transponder size of less than 1x1x1/4"**
- + min. weight of transponder < 10 g**
- + alternative attachments in the tire/rim**
- + maintenance-free operation**
- + environment - friendly**



6. Technical comparison



List of system parameters

characteristics		IQ-mobil	comp. Europe	comp. USA
pressure	range	0..6.5 bar (95 psi)	0..6.35 bar (92 psi)	1..4.5bar (65 psi)
	resolution	0.010 bar (0.145 psi)	0.025 bar (0.362 psi)	0.015 bar (0.22 psi)
	accuracy			
	(-40 to -20 C)	0.10 bar (1.45 psi)	0.150 bar (2.175 psi)	0.090 bar (1.305 psi)
	(-20 to +70 C)	0.010 bar (0.145 psi)	0.075 bar (1.08 psi)	0.090 bar (1.305 psi)
temperature range	(+70 to 100 C)	0.10 bar (1.45 psi)	0.150 bar (2.175 psi)	0.090 bar (1.305 psi)
	(+100 to 120 C)	0.10 bar (1.45 psi)	0.300 bar (4.35 psi)	
jamming danger		(-40 to 140 C)	(-40 to 120 C)	(-40 to 100 C)
lifetime/ maintenance		vehicle lifetime	3-5 years	3-5 years
up-date rate	standard	1 signal/s	1 signal/m	1 signal/m
	increased	5 signals/s	1.2 signals/s	2 signals/m
idletime of the system	nominal	1s	3.14s	30s
	at failure	2s	up to 12 minutes	up to 15 minutes
system availability	at standstill		restricted after ignition	no measurement
	after pressure change	after 2 meters	after ca. 3 minutes	after ca. 3 minutes
	after tire change		after ca. 10 minutes	after manual initialization

8. Suggestions for safety



Wissen bewegt Produkte

Reliability

Up-date rate as fast as technically feasible

RDKS measures continuously every second

Safety

immunity against interference as high as technically feasible

RDKS uses frequency hopping and high up-date rate

Economics

Tire element maintenance free up to the vehicle's lifetime

RDKS is maintenance free (no battery)